

## **REMARKS**

In the final Office Action, the Examiner rejected claims 18 – 26 as obvious over Luukkala (US 4,906,107) in view of Kim et al. (US 4,516,864), and rejected claims 28 and 29 as obvious over Luukkala and Kim in view of Nelson (US 4,756,627).

### **35 USC 103(a)**

Applicant respectfully traverses the rejection over the combined teachings of the prior art.

The present invention is different from the cited art in the following respects:

1. A specially designed probe has been used which ensures an efficient use of the available optical energy to achieve better performance.
2. The present method provides a probe that uses of a back coated concave mirror fixed at the common end of a Y guide fiber bundle. The probe design is such that the common end of the bundle lies at a distance of  $2f$  where  $f$  is the focal length of the mirror.
3. The bundles of optical fibers as disclosed in the present application enable particular advantages over the cited art. For instance, it is a far simpler task to image a reflected light signal onto a bundle of optical fibers rather than being plagued by the alignment problems inherent in use of a single fiber. In a more recent design of the present device, the common end of the bundle is of semicircular type where half the fibers are connected to a light source (called illuminating fibers) and the other half fibers (so called dark fibers) go to the detector. Since the area of cross section of the two halves is same, the illuminating fibers are imaged by the mirror on to the dark fibers giving an efficient light coupling. This advantage is inherent in the use of bundled fibers as disclosed in the original disclosure.
4. The use of a fiber Y-guide bundle in place of single fiber elements as done in the case in question, provide ease of light coupling. So there is ease of light coupling along with the efficiency.

5. The greater quantity of light available due to the efficient light collection arrangement in the present invention case also eases the optical signal processing requirements.

6. The chemical used is housed in an evacuated cell to prevent its oxidation and thus extending the life of the chemical which undergoes repeated heating and hence extends the life of the cell.

So the present method offers a number of distinct advantageous technical features which are non existent in the cited art.

A new claim 30 is submitted which provides that the chemical is added to the cell and the cell is evacuated, as disclosed on page 5, lines 19 and 20, of the specification. Claim 30 claims a light guide bundle as disclosed on page 6, line 8, on page 10, lines 11, 14, and 21.. Claim 30 claims a reflective coating on the outside of the concave mirror as disclosed on page 6, line 13, and on page 10, line 22. The bundles of optical fibers are adjacent one another at the sensing end of the probe as shown in the drawings as originally filed. As such, the new claim is supported by the original disclosure.

New claim 31 provides that the reflected signal is received at approximately twice the focal length of the concave mirror.

Amended claim 18 provides for an optical fiber bundle and a rear surface concave mirror in the probe. Amended claim 28 provides for detection at a multiple of the focal length of the mirror.

The comments on the prior art as set forth in the prior response are incorporated herein by reference. The prior art does not show the combination of features set forth in the claims presented herein, whether the references are considered alone or in combination. As such, the claimed invention is non-obvious over the art.


**Conclusion**

Favorable reconsideration of the present application is hereby requested.  
Applicant respectfully submits that the present application is in condition for allowance.

**Deposit Account Information**

The Commissioner is hereby authorized to charge any additional fees which may be required or to credit any overpayment to account no. 501519.

Respectfully submitted,



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